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10/613,507

07/03/2003

Eugene Feinberg

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EXAMINER

SAINDON, WILLIAM V

ART UNIT

PAPER NUMBER

3623

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/613,507	Applicant(s) FEINBERG ET AL.	
	Examiner William V. Saindon	Art Unit 3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The following NON FINAL Office Action is in response to Applicant's submission received July 3, 2003. Claims 1-10 are pending.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-10 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The invention as claimed is directed towards the statutory category of a process. However, the invention contains the abstract idea of an algorithm and therefore falls under a 35 U.S.C. 101 judicial exception. A practical application of a judicial exception may render the invention statutory. A claimed invention is directed to a practical application of a 35 U.S.C. 101 judicial exception when it either transforms an article or physical object to a different state or thing, or otherwise produces a useful, concrete and tangible result. See MPEP § 2106.

The present invention does not transform an article or physical object because it is merely a scheduling algorithm.

The present invention does not produce a tangible result because the end result of the process is a plan, which is an idea, not a 'real-world result.'

The steps of identifying, developing, and assessing do not produce a real world result. Only data and other abstract ideas are manipulated. Further, the claim is not limited to implementation on a computer, by the plain language of the claims.

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Additionally, the specification points out that the invention may be implemented as "hardware, software, firmware, [or] processors." Specification at 9. Therefore, the invention's method could be a series of steps not run on a computer or not tangibly embodied in a computer readable medium, but be non-statutory software code, pseudo-code, or mental steps. Because the invention never produces a result that is seen in the real, tangible world, it is not a practical application of a judicial exception.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claim 1, both theoretical probabilities and actual probabilities are calculated, but it is unclear as to what the probabilities are being calculated for. Probabilities that a job will happen? Probabilities of when a job will be requested? Probabilities of whether a schedule is feasible? The specification at page 13, last paragraph, state that the process for creating theoretical probabilities is found in steps 4 and 5 on page 11. However, steps 4 and 5 are in formulaic notation, without any explanation of each of the variables or formulas provided. It is unclear what the

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formulas represent, where to get data to use in them, and what the relevance of their output is.

Furthermore, the steps claimed are missing important steps. For example, the specification and drawings state that after each of the determining steps, the process may terminate. However, these steps are not in the claim.

Because it is unclear what the actual steps in claim 1 do, it is impossible to directly match claim limitations to the prior art. However, for purposes of examination, the Examiner will construe claim 1 to perform the following steps:

- A. determine whether a feasible schedule is possible.
- B. determine whether a round robin schedule is possible.
- C. if a feasible schedule is impossible or a round robin schedule is possible, terminate.
- D. generating a feasible schedule wherein each job has a probability associated with it.

As to claims 2-8, various formulas are given without listing what the variables in the formulas are. Therefore it is impossible to determine the scope of the claim.

As to claim 10, "means for" language is used. However, the equivalents required to be specified under § 112, sixth paragraph, are not found in the specification, rendering the scope of the claim unclear. Therefore, the Examiner will construe the language as NOT intending to invoke § 112, sixth paragraph, but be directed toward a computerized 'means' - i.e. computer steps. The Examiner respectfully requests

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Applicant to remove the "means for" language, and to explicitly confirm that Applicant does not intend to invoke § 112, sixth paragraph.

If Applicant does intend to invoke § 112, sixth paragraph, the Examiner respectfully requests Applicant to explicitly acknowledge as such and specifically point out where each "means for" element is supported by the specification.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

6. Claims 1-10 are rejected under 35 U.S.C. 102(a) as being anticipated by Eugene A. Feinberg et al., "Sensor Resource Management for an Airborne Early Warning Radar," Proceedings of SPIE Vol. 4728, Signal and Data Processing of Small Targets (April, 2002) (hereinafter Feinberg).

As to claim 1, Feinberg discloses a method of generating a feasible schedule for n jobs given a duration and a revisit time for each job, comprising:

determining whether it is impossible to generate a feasible schedule (see p. 151, step 2 of Frequency Based Algorithm);

determining whether a round robin schedule is possible (see p. 151, step 3 of Frequency Based Algorithm);

calculating theoretical probabilities (see p. 151, step 4 of Frequency Based Algorithm);

calculating actual probabilities (see p. 151, step 8 of Frequency Based Algorithm);

creating a potential schedule based on the theoretical probabilities and the actual probabilities (see p. 151, step 8 of Frequency Based Algorithm); and

searching for a feasible schedule from the potential schedule (see p. 151, step 15 of Frequency Based Algorithm).

As to claim 2, Feinberg discloses the formula presented (see p. 151, step 2 of Frequency Based Algorithm).

As to claim 3, Feinberg discloses the formula presented (see p. 151, step 3 of Frequency Based Algorithm).

As to claim 4, Feinberg discloses the formula presented (see p. 151, step 4 of Frequency Based Algorithm).

As to claim 5, Feinberg discloses the formula presented (see p. 151, step 4 of Frequency Based Algorithm).

As to claim 6, Feinberg discloses the formula presented (see p. 151, step 5 of Frequency Based Algorithm).

As to claim 7, Feinberg discloses the formula presented (see p. 151, step 8 of Frequency Based Algorithm).

As to claim 8, Feinberg discloses the formula presented (see p. 151, step 8 of Frequency Based Algorithm).

As to claim 9, Feinberg discloses the method of claim 1 on a computer (see p. 150, noting that software was developed and simulations were run).

As to claim 10, Feinberg discloses the method of claim 1, each step a means for completing the method.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amotz Bar-Noy et al., "Nearly Optimal Perfectly-Periodic Schedules," (Nov. 1, 2000) (hereinafter Bar-Noy), in view of Michael B. Jones et al., "CPU Reservations and Time Constraints," ACM (1997) (hereinafter Jones).

As to claim 1, Bar-Noy discloses:

D. generating a feasible schedule wherein each job has a probability associated with it (see p. 4, equation 1, noting that w is the demand probability of job/page i ., and that the formula is used to determine a schedule that is feasible given the formula's inputs).

However, Bar-Noy fails to explicitly disclose, and Jones discloses:

A. determine whether a feasible schedule is possible (see section 1.5, noting that infeasible time constraints are denied).

B. determine whether a round robin schedule is possible (see section 3.4, noting round-robin scheduling is used).

C. if a feasible schedule is impossible or a round robin schedule is possible, terminate (see section 1.5, noting infeasible constraints are denied; section 3.4, noting if a round robin is found, it is used instead; see also section 2.4, noting the if(schedulable) function)

It would have been obvious to a person having ordinary skill in the art at the time of invention to have added to the scheduler in Bar-Noy the feasibility and round-robin determinations in Jones. As in Jones, it is within the capabilities of one of ordinary skill in the art to execute these checks before undertaking the more complex scheduling of Bar-Noy, with the predictable result of eliminating infeasible schedules and easily solved schedules.

Claims 9 and 10 are rejected as being the computer-readable medium and system claims of claim 1. It is obvious to convert a known method into software or a software/computer system.

Conclusion

10. This Office action has an attached requirement for information under 37 C.F.R. § 1.105. A complete response to this Office action must include a complete response to the attached requirement for information. The time period for reply to the attached requirement coincides with the time period for reply to this Office action.

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chih-wen Hsueh et al., "Distributed Pinwheel Scheduling with End-to-End Timing Constraints," IEEE (1995), disclose pinwheel scheduling.

Mee Yee Chan & Francis YL Chin, "General Schedulers for the Pinwheel Problem Based on Double-Integer Reduction," IEEE Transactions on Computers, Vol. 41, No. 6, p. 755 (June 1992), disclose scheduling for the pinwheel problem.

Chih-wen Hsueh & Kwei-Jay Lin, "Scheduling Real-Time Systems with End-to-End Timing Constraints Using the Distributed Pinwheel Model," IEEE Transactions on Computers, Vol. 50, No. 1, p. 51 (Jan. 2001), disclose scheduling for the pinwheel problem in polynomial time.

Amotz Bar-Noy et al., "Minimizing Service and Operation Costs of Periodic Scheduling," Proceedings of the ninth annual ACM-SIAM symposium on Discrete algorithms, p. 11 (1998), disclose pinwheel scheduling according to various heuristics.

C.L. Liu & James W. Layland, "Scheduling Algorithms for Multiprogramming in a Hard-Real-Time Environment," ACM (1973), disclose scheduling algorithms given a fixed revisit time.

Sanjoy Baruah & Azer Bestavros, "Pinwheel Scheduling for Fault-tolerant Broadcast Disks in Real-time Database Systems," IEEE (1997) discloses a pinwheel scheduler.

Eugene A. Feinberg, List of Published Papers, discloses a listing of one of the inventor's published papers.

Banerjee et al. (US 6,704,692) disclose a method of solving a tracking problem by selecting among candidate tracks.

Lesaint et al. (US 6,578,005) disclose a resource allocation method in which a stochastic search analyzes created schedules to fix the best ones for eventual implementation.

Ramaswamy (US 7,043,731) discloses a round robin algorithm.

12. This Office action has an attached requirement for information under 37 CFR 1.105. A complete reply to this Office action must include a complete reply to the attached requirement for information. The time period for reply to the attached requirement coincides with the time period for reply to this Office action.

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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to William V. Saindon whose telephone number is (571)270-3026. The examiner can normally be reached on M-F 7:30-5; alt. Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on (571) 272-6729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/wvs/
/Scott L Jarrett/
Primary Examiner, Art Unit 3623

Request for Information under 37 CFR § 1.105

14. Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

15. This request for information is required in order to ascertain the scope of the invention and relevant background materials, given the disclosed prior art.

16. In response to this requirement, please provide answers to each of the following interrogatories eliciting factual information:

A. Please specify which equations from claims 2-8 are prior art or well-known in the art.

B. Please specify which equations from claims 2-8 were created by the inventors.

C. Please specify the contribution of each author of the Feinberg et al. document entitled "Sensor Resource Management for an Airborne Early Warning Radar" (2002) to the present invention's disclosed subject matter.

17. In response to this requirement, please provide a copy of each of the following items of art referred to in the specification: each reference listed in the description of the related art, and each reference listed in the references cited section of the provisional application.

18. In response to this requirement, please provide the title, citation and copy of each publication that is a source used for the description of the prior art in the disclosure. For

each publication, please provide a concise explanation of that publication's contribution to the description of the prior art.

19. In response to this requirement, please provide the title, citation and copy of each publication that any of the applicants relied upon to develop the disclosed subject matter that describes the applicant's invention, particularly as to developing the Frequency Based Algorithm (i.e. the claimed invention). For each publication, please provide a concise explanation of the reliance placed on that publication in the development of the disclosed subject matter.

20. In response to this requirement, please state the specific improvements of the subject matter in claims 1-10 over the disclosed prior art and indicate the specific elements in the claimed subject matter that provide those improvements. For those claims expressed as means or steps plus function, please provide the specific page and line numbers within the disclosure which describe the claimed structure and acts.

21. In responding to those requirements that require copies of documents, where the document is a bound text or a single article over 50 pages, the requirement may be met by providing copies of those pages that provide the particular subject matter indicated in the requirement, or where such subject matter is not indicated, the subject matter found in applicant's disclosure.

22. The fee and certification requirements of 37 CFR 1.97 are waived for those documents submitted in reply to this requirement. This waiver extends only to those documents within the scope of this requirement under 37 CFR 1.105 that are included in the applicant's first complete communication responding to this requirement. Any

supplemental replies subsequent to the first communication responding to this requirement and any information disclosures beyond the scope of this requirement under 37 CFR 1.105 are subject to the fee and certification requirements of 37 CFR 1.97.

23. The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained may be accepted as a complete reply to the requirement for that item.

24. This requirement is an attachment of the enclosed Office action. A complete response to the enclosed Office action must include a complete response to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action, which is 3 months.

25. The period for reply to an office action on the merits is ordinarily set for 3 months.

/wvs/